Amendments to the Specification:

Please amend the last paragraph in the Brief Description of the Drawings on pages 3 and 4 as follows:

Figure 5 shows a cross-sectional view of an embodiment of a microreactor integrated with a microcombustor ~~microcumbuster~~.

Please amend paragraph [0012] on page 4 as follows:

[0012] Referring to Figure 1A, a chemical microreactor 2 comprises: a bottom substrate 4a comprising silicon, glass or ceramic, a top substrate 4b comprising silicon, glass or ceramic, at least one capillary microchannel 6 having at least one inlet 8 for fuel and water and at least one outlet 10 for gases, a liquid reservoir 9 ~~(not shown)~~ containing a fuel source, at least one porous membrane12, and at least one integrated heater 14 for heating the microchannel. Referring to Figure 1B, a porous membrane support structure 13 comprising silicon, glass or ceramic containing a plurality of porous membranes 12 is an effective alternate embodiment to porous membrane 12 of Figure 1A. Microreactor 2 can further comprise a catalytic combustion microfluidic heat source (not shown) to heat the gases flowing through the microchannel and porous membrane(s).

Please amend paragraph [0014] on pages 4 and 5:

[0014] Referring to Figure 2A, the fuel-water mixture can first be heated by resistive heaters in a "gassifier region" 15, i.e., the region where the fuel inlet connects to the microchannel, forming a fuel-steam gas. The fuel-steam gas then flows through microchannel 6. The microchannel can be packed with a catalyst 7 material such as, platinum, platinum-ruthenium, nickel, palladium, copper, copper oxide, ceria, zinc oxide, alumina, combinations thereof and alloys thereof. Resistive heaters 14 can be positioned along the microchannel. Heating microchannel 6 to a temperature between about 250 °C and about 650 °C by resistive heaters facilitates the occurrence of catalytic steam reforming reactions. The desired temperature depends upon the source of fuel. For example, about 250 °C is an effective temperature if methanol is used, whereas ammonia requires a temperature closer to about 650 °C. Microchannel 6 is formed in a configuration that allows adequate volume and surface area for the fuel-steam gas to react as it flows through microchannel 6 and porous membrane 12. Electrical connection pads 16 provide current to resistive heaters 14. Although not shown, electrical pads 16 are connected to a power source. Figure 2B is a cross-sectional illustration of the embodiment depicted in Figure 2A.

Please amend paragraph [0017] on page 6 as follows:

[0017] Hydrogen gas is generated by heating microchannel 6 and porous membrane 12 to an appropriate temperature, i.e., about 250°C to about 650°C. The fuel-steam source is reformed into gaseous byproducts, i.e., hydrogen and subsequent byproducts, such as carbon monoxide and carbon dioxide, as the molecules diffuse through the membrane and flow into a fuel cell or other power source. Hydrogen is the component of the liquid fuel source that is converted into energy by a fuel cell. If chemical microreactor 2 is used in concert with a fuel cell, the gaseous molecules, after passing through the membrane structure, flow through at least one other microchannel, i.e., a gas flow channel. The gas flow channel is located at the exit side of catalytic membrane 12 and is connected to the anode manifold 11a of a fuel cell 11. Additional embodiments can include the integration of a porous getter structure or permaselective membrane material at the exit side of porous membrane 12 to adsorb the product gases allowing only the hydrogen to diffuse through to the fuel cell. It is beneficial to adsorb product gases if the presence of the additional byproducts will degrade the components of the fuel cell. Any fuel cell that uses hydrogen as a fuel source can be effectively used with this invention. For example, effective fuel cells include the micro-electro mechanical system based (MEMS-based) fuel cells discussed in U.S. Patent Application 09/241,159 by Alan Jankowski and Jeffrey Morse (now U.S. Patent No. 6,638,654) which is hereby incorporated by reference.

Please amend paragraph [0028] on page 10 as follows:

[0028] The membrane area and microchannel areas are made large enough to allow sufficient fuel flow for the power source requirements. In one embodiment, the capillary microchannels support a fuel flow rate in the range of about 1 microliter/minute to about 600 microliters/minute. In some cases, if resistive heaters require too much input electrical power to heat the microchannels and porous membrane, exothermic combustion reactions may be initiated. These exothermic combustion reactions may be self-sustaining and thus, do not require additional power.

Please amend the Abstract as follows. A clean substitute Abstract sheet also accompanies this response.

~~Disclosed is a~~ A chemical microreactor ~~that provides a means to generate~~ suitable for generation of hydrogen fuel from liquid sources such as ammonia, methanol, and butane through steam reforming processes when mixed with an appropriate amount of water~~. The microreactor~~ contains capillary microchannels with integrated resistive heaters to facilitate the occurrence of

catalytic steam reforming reactions. ~~Two distinct embodiment styles are discussed.~~ One ~~embodiment style~~ such microreactor employs a packed catalyst capillary microchannel and at least one porous membrane. Another ~~embodiment style~~ employs a porous membrane with a large surface area or a porous membrane support structure containing a plurality of porous membranes having a large surface area in the aggregate, i.e., greater than about 1 m^2/cm^3. ~~Various methods to form~~ The packed catalyst capillary microchannels, porous membranes and porous membrane support structures may be formed by a variety of methods ~~are also disclosed~~.